

INFLUENCE OF SEDIMENTARY AND SEAGRASS MICROBIAL COMMUNITIES ON SHALLOW WATER BENTHIC OPTICAL PROPERTIES

Fred Dobbs

Department of Oceanography

Old Dominion University

Norfolk, VA 23529

phone:(757)-683-5329 fax:(757)-683-5303 email: fdobbs@odu.edu

Award #: N000149710018

LONG-TERM GOAL

My long-term goal is to contribute to the CoBOP project's development of a radiative-transfer model for selected sub-littoral zone environments. My particular interests concern the optical effects of microorganisms on seagrass blades and in sediments.

SCIENTIFIC OBJECTIVES

Determine the biomass and composition of sedimentary microorganisms at field sites nearby Lee Stocking Island, Bahamas, and in Monterey Bay, California.

When possible, assess seasonal and interannual variations in these microbial communities.

Similarly, determine the biomass, composition, and temporal variation (seasonal and interannual) of microorganisms associated with seagrass blades at Lee Stocking Island (*Thalassia* spp.) and in Monterey Bay (*Zostera marina*).

In concert with other CoBOP researchers, assess how the microbial community affects the flux of photons to and from the sediments and eelgrass blades and how temporal changes in the microbiological community influence temporal changes in benthic optical characteristics.

APPROACH

My approach to determining biomass and composition of microbial communities is through quantitative extraction and quantification of their membrane phospholipids (Dobbs and Findlay, 1993; Findlay and Dobbs, 1993). The assortment of phospholipid fatty acids found in an organism is a phenotypic description of its biochemical capabilities. Thus, microbes with differing biochemical pathways will exhibit differing fatty-acid profiles. While some fatty acids are present in all living cells, others are sufficiently specific to certain groups of microorganisms that they are used as biomarkers. PLFA have proven to be reproducible, capable indicators of a wide suite of microbes encountered in the environment (e.g., Guckert et al., 1985). These PLFA are powerful, discriminating tools for elucidation of microbial biomass, composition, activity, and even physiologic condition without the problems associated with direct enumeration or culture (White,

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1986; Guckert and White, 1988).

Beginning in FY98, I will participate in a series of expeditions to the two study sites to collect samples and analyze them for their lipid biomarkers and lipid profiles.

I have been the principal participant in this first year of the project. In addition, this project has supported Ms. Lisa Drake, a Ph.D. student who will defend her dissertation in November 1997. She has been learning techniques to study microbial lipids and will continue with this project as a half-time post-doc beginning in January 1998.

WORK COMPLETED

I am the organizer of the "sediment group" in the CoBOP project, and am responsible for coordinating six other PIs (Allison, Brand, Burdige, Decho, Reid, Wheatcroft). In FY97, a planning year for this project, I have: a) served as group representative at CoBOP's all-hands meeting in November 1996; b) represented the group during the site visit to Lee Stocking Island; c) coordinated logistics for sediment-group members as we prepare for a sampling trip to Monterey Bay in November 1997.

The trip to Lee Stocking Island involved dives on potential study sites and consideration of the suitability of the facilities for our studies. As part of a post-trip report, my brief descriptions of sedimentary environments was posted on the CoBOP home page.

Work in the laboratory has focused on the development of techniques for sampling sediments and seagrass leaves for lipid analysis.

RESULTS

There are no technical results for FY97, as it principally was a year of planning for field campaigns to begin in November 1997.

IMPACT/APPLICATION

Nothing to report; field work will begin in November 1997.

TRANSITIONS

Nothing to report; field work will begin in November 1997.

RELATED PROJECTS

Reports of the other members of the CoBOP sediment group (Allison, Brand, Burdige, Decho, Reid, Wheatcroft) may be found elsewhere in this document.

Peter Visscher (Marine Sciences, University of Connecticut) and I will collect complementary

samples from seagrass beds. With NSF support, he studies the partitioning of chemical and microbiological metabolism in Long Island Sound sediments.

REFERENCES

No publications from FY97 (year 1 of project).

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